

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing

(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220FOR FURTHER ACTION
See paragraph 2 belowInternational application No.
PCT/GB2004/003592International filing date (day/month/year)
20.08.2004Priority date (day/month/year)
22.08.2003International Patent Classification (IPC) or both national classification and IPC
B63G8/22Applicant
ABERDEEN UNIVERSITY

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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10/568983

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**International application No.
PCT/GB2004/003592

IAP20 Res'CPOTA/PTO 21 FEB 2006

Box No. 1 Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**International application No.
PCT/GB2004/003592**Box No. II Priority**

1. ☒ The following document has not been furnished:
- ☒ copy of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(a)).
 - ☐ translation of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(b)).
- Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.
2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

| | | |
|-------------------------------|-------------|------|
| Novelty (N) | Yes: Claims | 1-18 |
| | No: Claims | |
| Inventive step (IS) | Yes: Claims | 1-18 |
| | No: Claims | |
| Industrial applicability (IA) | Yes: Claims | 1-18 |
| | No: Claims | |

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

IAP20 Rec'd PCT/PTO 21 FEB 2006

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/GB2004/003592

Point V

1. Document US-A-6 371 041 (D1) is considered to be the closest prior art and discloses an underwater submersible having a buoyancy control system consisting of open cylinders which buoyant volume can be adjusted and that are open to the external environment.

The subject matter of claim 1 differs therefrom in that the buoyancy control system consists of a buoyancy chamber with seawater inlet and outlet and in that the hydraulic system contains a pressure multiplier.

Article 33(2) PCT is met.

2. The problem posed in the mentioned system and in other prior remotely operated vehicles and autonomous operated vehicles, is that of the buoyancy capacity being affected when dropping off or picking up an object underwater, since the range of buoyancy values and its rate of change is reduced. This results in a rapid rise to the surface or dropping to the seabed. Furthermore, compressed air systems are inefficient at great depths, due to the very high air pressures required.

The solution proposed in the present application consists of providing a buoyancy chamber with an inlet and outlet for sea water, in which the rate of incoming and out coming water is enhanced by a pressure multiplier associated to the hydraulic system. This permits to pump out water at very high pressures, that is, at large depths.

None of the documents of available prior art anticipate in combination such solution.

Article 33 (3) PCT is met.

3. Claims 2-18 are dependent on claim 1.

Point VII

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art

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International application No.

PCT/GB2004/003592

disclosed in the documents D1 is not mentioned in the description, nor is this document identified therein.

2. Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).